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IS 6297-3 (1974): Transformers and inductors (Power, audio, pulse and switching) for electronic equipment, Part 3: Audio frequency transformers and chokes [LITD 5: Semiconductor and Other Electronic Components and Devices]



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IS: 6297 (Part III) - 1974
(Superseding IS : 3289 - 1965 and IS : 4002 - 1967)

Indian Standard

SPECIFICATION FOR TRANSFORMERS AND INDUCTORS (POWER, AUDIO, PULSE AND SWITCHING) FOR ELECTRONIC EQUIPMENT

PART III AUDIO FREQUENCY TRANSFORMERS AND CHOKES

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Indian Standard

**SPECIFICATION FOR
TRANSFORMERS AND INDUCTORS
(POWER, AUDIO, PULSE AND SWITCHING)
FOR ELECTRONIC EQUIPMENT**

**PART III AUDIO FREQUENCY TRANSFORMERS
AND CHOKES**

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IS:6297 (Part III)-1974

(Continued from page 1)

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Indian Standard
SPECIFICATION FOR
TRANSFORMERS AND INDUCTORS
(POWER, AUDIO, PULSE AND SWITCHING)
FOR ELECTRONIC EQUIPMENT
PART III AUDIO FREQUENCY TRANSFORMERS
AND CHOKES

0. FOREWORD

0.1 This Indian Standard (Part-III) was adopted by the Indian Standards Institution on 12 July 1974, after the draft finalized by the Transformers and Inductors for Electronic Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard lays down the requirements of audio frequency transformers, with two or more windings and chokes with or without dc polarization, used in electronic equipment including transistorized versions. This standard supersedes IS:3289-1965* and IS:4002-1967† and incorporates improvements in the methods of measurements and requirements taking into account the experience gained in the implementation of IS:3289-1965* and IS:4002-1967† and the developments in the electronic field.

0.3 This standard is to be used in conjunction with IS:6297 (Part I)-1971‡ which is a necessary adjunct. Should, however, any deviation occur between IS:6297 (Part I)-1971‡ and this standard the provisions of the later shall prevail. The information to be given along with the enquiry or order is given in Appendix A.

0.4 This standard is one among the series of the Indian Standards for transformers and inductors.

*Tests and general requirements for audio frequency transformers and chokes.

†General requirements and tests for audio frequency transformers and chokes used in transistorized equipment.

‡Specification for transformers and inductors (power, audio, pulse and switching) for electronic equipment: Part I General requirements and tests.

IS:6297 (Part III) - 1974

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS: 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part III) lays down the tests and requirements of audio frequency transformers with two or more windings and chokes with or without dc polarization, used in electronic equipment including transistor circuits.

1.2 This standard does not cover pulse and blocking oscillator transformers and transformers used in dc to dc conversion equipments.

2. TERMINOLOGY

2.0 For the purpose of this standard, the definitions given in IS:6297 (Part I)-1971† shall apply.

3. CATEGORIES AND GRADES

3.1 Categories — Provisions of **3.1** of IS:6297(Part I)-1971† shall apply.

3.2 Grades — There shall be three grades of the AF transformers and the chokes, depending on their insulation resistance values (*see* Insulation resistance test in Table 1).

4. MATERIALS, CONSTRUCTION AND WORKMANSHIP

4.1 The provisions of **4** of IS:6297 (Part I)-1971† shall apply.

5. MARKING

5.1 AF Transformers

5.1.1 In addition to the markings specified in IS:6297 (Part I)-1971†, as many of the following as possible shall be marked on each transformer, in the order of priority specified below:

- a) Source impedance, terminating impedances and turns ratio;
- b) Power handling capacity;
- c) Maximum dc current;

*Rules for rounding off numerical values (*revised*).

†Specification for transformers and inductors (power, audio, pulse and switching) for electronic equipment: Part I General requirements and tests.

- d) Maximum working voltage;
- e) Frequency range for a response of ± 1.5 dB or any other specified value with respect to output at 1 kHz;
- f) Category and grade; and
- g) dc resistances of windings.

5.1.2 All the information mentioned in **5.1.1** shall also be provided in the catalogue.

5.1.3 Where more than one windings are provided, a circuit diagram of the transformer with appropriate indications shall also be made available with each transformer.

5.2 Chokes

5.2.1 In addition to the markings specified in IS : 6297 (Part I)-1971*, as many of the following as possible shall be marked on each choke in the order of priority specified below:

- a) dc resistance;
- b) Inductance at a specified voltage and frequency with dc superimposed, if any;
- c) Maximum dc current;
- d) Maximum working voltage;
- e) Grade and category in accordance with this standard;
- f) Terminal identification; and
- g) Frequency range of operation.

5.2.2 All the information included in **5.2.1** shall also be provided in the catalogue.

5.3 The AF transformer and the choke may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1936 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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6. TESTS

6.1 General Conditions for Tests

6.1.1 The provisions given in 6.1 of IS: 6297 (Part I)-1971* shall apply.

6.2 Classification of Tests

6.2.1 *Type Tests*—The provisions of 6.1.6.1 of IS: 6297 (Part I)-1971* shall apply.

6.2.2 *Acceptance Tests*—The provisions of 6.1.6.2 of IS: 6297 (Part I)-1971* shall apply. The following tests and all the routine tests (see 6.2.3) shall constitute the acceptance tests:

Group A (For Non-destructive Tests)

- a) Dimensions, if specified;
- b) Bump;
- c) Vibration; and
- d) Applicable electrical tests:
 - i) Reflected load impedance,
 - ii) Frequency response,
 - iii) Harmonic distortion,
 - iv) Power handling capacity,
 - v) Insertion loss,
 - vi) Electrostatic shielding (for shielded type),
 - vii) Magnetic shielding (for shielded type),
 - viii) Phase shift,
 - ix) Inductive unbalance (for transformers with C.T.),
 - x) Centre tap balance,
 - xi) Temperature rise, and
 - xii) Insulation resistance.

Group B (For Destructive Tests)

- a) Robustness of terminations
- b) Soldering, and
- c) Climatic sequence.

6.2.3 *Routine Tests*—The following tests shall be carried out on each AF transformer or choke as routine tests:

- a) Visual examination,
- b) Sealing (for sealed type only), and

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- c) Applicable electrical tests:
- i) dc resistance and winding continuity,
 - ii) Insulation resistance,
 - iii) Turns ratio,
 - iv) Voltage proof,
 - v) Polarity, and
 - vi) Inductance/Impedance.

7. TEST SCHEDULE

7.0 General—The test schedule specifies all tests and the order in which they shall be carried out as well as the requirements to be met with.

7.1 Test Schedule—The test schedule shall be as specified in Table 1.

NOTE 1 — The clause references, conditions of tests and requirements specified are applicable for acceptance and routine tests also and the groupings are for the purpose of type tests only (see 6.2).

NOTE 2 — Conditions of tests and values for the requirements that are to be specified according to IS : 6297 (Part I)-1971* only are given in col 3 and 4 of Table 1. Other conditions of tests and the values for the requirements are according to IS : 6297 (Part I)-1971*.

TABLE 1 TEST SCHEDULE

(Clauses 3.2 and 7.1)

[See also Appendix A of IS : 6297 (Part I)-1971*]

TEST	CLAU SE REFERENCE OF IS : 6297 (Part I)- 1971*	CONDI- TIONS OF TEST	REQUIREMENT
(1)	(2)	(3)	(4)
<i>All Samples (12 Samples)</i>			
Visual examination	6.3.1	—	—
Dimensions	6.3.2	—	—
Continuity of winding	6.2.1.1	—	—

*Specification for transformers and inductors (power, audio, pulse and switching) for electronic equipment: Part I General requirements and tests.

(Continued)

*Specification for transformers and inductors (power, audio, pulse and switching) for electronic equipment: Part I General requirements and tests.

TABLE 1 TEST SCHEDULE — *Contd*

TEST	CLAU SE REFERENCE OF IS : 6297 (Part I) - 1971*	CONDI TIONS OF TEST	REQUIREMENT
(1)	(2)	(3)	(4)
dc resistance of winding(s)	6.2.1.2	—	The resistance value shall not differ from the stated value by more than as specified below: For conductor size equal to or greater than 0.12 mm $\pm 10\%$ For conductor size below 0.12 mm $\pm 15\%$
Polarity	6.2.1.3	—	—
Shielding (where applicable)	6.2.1.4	—	As agreed to between the manufacturer and the customer
a) Electrostatic shielding			
b) Magnetic shielding			
Temperature rise test	6.2.1.5	—	—
Insulation resistance	6.2.1.6	—	Insulation resistance values shall be as stated below: For Grade 1 ≥ 5000 M ohm For Grade 2 ≥ 1000 M ohm For Grade 3 ≥ 100 M ohm
Voltage proof (high voltage)	6.2.1.7	—	—
Inductance and ac resistance	6.2.3.1	—	—
Inductive unbalance	6.2.3.2	—	—
Centre tap balance	—	Under consideration	Under consideration
Turns ratio	6.2.3.3	—	—
Reflected load impedance	6.2.3.4	—	—
Frequency response	6.2.3.5	—	—
Harmonic distortion	6.2.3.6	—	—
Power handling capacity	6.2.3.7	—	—
Insertion loss	6.2.3.8	—	—
Phase shift	6.2.3.9	—	—

*Specification for transformers and inductors (power, audio, pulse and switching) for electronic equipment: Part I General requirements and tests.

(Continued)

TABLE 1 TEST SCHEDULE — *Contd*

TEST	CLAUSe REFERENCE OF IS : 6297 (Part I) - 1971*	CONDI- TIONS OF TEST	REQUIREMENT
(1)	(2)	(3)	(4)
The samples shall then be divided into four groups of three AF transformers/chokes each and the AF transformers/chokes in each group shall undergo the tests specified for each group			
<i>Group 1</i>			
Hermetic sealing	6.3.5	—	—
Soldering	6.3.4	—	—
Robustness of terminations	6.3.3	—	—
Bump	6.3.6	—	—
Vibration	6.3.7	—	—
Acceleration	6.3.8	—	—
Shock	6.3.9	—	—
Climatic sequence	6.4.1	—	—
Dry heat	6.4.1.1	—	Insulation resistance value shall be as stated below: For Grade 1 ≥ 50 M ohm For Grade 2 ≥ 10 M ohm For Grade 3: under consideration
Damp heat (accelerated) (first cycle)	6.4.1.2	—	—
Cold test	6.4.1.3	—	—
Low air pressure	6.4.1.4	—	—
Damp heat (accelerated) (remaining cycles)	6.4.1.5	—	Insulation resistance value shall be as stated below: <i>After 1½ hours recovery:</i> For Grade 1 ≥ 1000 M ohm For Grade 2 ≥ 100 M ohm For Grade 3 ≥ 10 M ohm <i>After 24 hours recovery:</i> For Grade 1 ≥ 2500 M ohm For Grade 2 ≥ 500 M ohm For Grade 3 ≥ 50 M ohm

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(Continued)

TABLE 1 TEST SCHEDULE — *Contd*

TEST	CLAUSe REFERENCE OF IS : 6297 (Part I)- 1971*	CONDI- TIONS OF TEST	REQUIREMENT
(1)	(2)	(3)	(4)
Rapid change of temperature	6.4.3	—	After recovery, the insulation resistance value shall be as stated below: For Grade 1 \geq 1 000 M ohm For Grade 2 \geq 100 M ohm For Grade 3 \geq 10 M ohm
Salt mist	6.5	—	—
Group 2			
Mould growth	6.6	—	—
Group 3			
Damp heat (long term)	6.4.2	—	Insulation resistance value shall be as stated below: <i>After 1½ hours recovery:</i> For Grade 1 \geq 1 000 M ohm For Grade 2 \geq 100 M ohm For Grade 3 \geq 50 M ohm <i>After 24 hours recovery:</i> For Grade 1 \geq 2 500 M ohm For Grade 2 \geq 500 M ohm For Grade 3 \geq 50 M ohm
Group 4			
Endurance	6.8	—	Insulation resistance value shall be as stated below: For Grade 1 \geq 2 500 M ohm For Grade 2 \geq 500 M ohm For Grade 3 \geq 50 M ohm

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APPENDIX A

(Clause 0.3)

INFORMATION TO BE GIVEN BY THE PURCHASER

A-1. At the time of order or enquiry, the purchaser of the audio frequency transformer or choke shall furnish information on the following items.

A-1.1 Transformers

- a) Grade;
- b) Category;
- c) Primary and source impedance;
- d) Secondary and load impedance;
- e) Turns ratio;
- f) dc resistance of windings and limits;
- g) dc currents in windings
- h) Frequency range for a response of ± 1.5 dB or for any other specified value with respect to output at 1 kHz;
- j) Harmonic distortion at the specified frequency and power handling capacity at specified distortion;
- k) Insertion loss;
- m) Limits, if any, for phase shift;
- n) Shielding requirements — electrostatic and electromagnetic;
- p) Any other requirements such as dimensions, termination and style of mounting, insulation working voltage, etc; and
- q) Limiting values for inductive unbalance test.

A-1.2 Chokes

- a) Grade;
- b) Category;
- c) Inductance;
- d) Frequency range of operation;
- e) Maximum dc current through winding;
- f) ac voltage across winding;
- g) Maximum dc resistance of winding; and
- h) Any other requirements such as dimensions, termination and style of mounting, insulation working voltage, etc.

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